

# Bear Creek Headwaters

## **SUBWATERSHED**

Report Card 2018



The St. Clair Region Conservation Authority has prepared this series of 14 subwatershed report cards as a summary of the state of the forests, wetlands, and water resources in the St. Clair Region.





# BEAR CREEK HEADWATERS SURFACE WATER QUALITY

# D GRADE

## Surface Water Quality

Using a provincial grading system, the three surface water quality indicators score two C grades and one F grade, producing an overall grade of D for the Bear Creek Headwaters subwatershed. Total phosphorus (TP) levels are the third highest in the St. Clair Region at nearly seven times the provincial guideline. Maintaining TP levels below the Interim Provincial Water Quality Objective is intended to control excessive plant growth in rivers and streams and to protect aquatic life. *Escherichia coli* (*E. coli*) levels are slightly above average for the St. Clair Region and are nearly three times the provincial guideline for safe recreational use of water, indicating ongoing fecal contamination. The stream health grade measured by sampling benthic invertebrate communities is better than the average for the St. Clair Region but still suggests that fairly substantial organic pollution is likely.

## Local Actions to Improve Water Quality

- Develop an Environmental Farm Plan and implement agricultural Best Management Practices;
- Plant and maintain vegetated streamside buffers on one side of municipal drains and along both sides of other watercourses to stabilize the banks, shade the water, and capture nutrients;
- Fix faulty septic systems and establish a septic maintenance plan;
- Create or restore wetlands to trap nutrients, mitigate flooding, and improve habitat;
- Properly store chemicals and dispose of them through household hazardous waste days or drop-off locations (never dump down household or storm drains).

INDICATOR	BEAR CREEK HEADWATERS			ST. CLAIR REGION AVERAGE	PROVINCIAL GUIDELINE	INDICATOR DESCRIPTION
	2001-2005	2006-2010	2011-2015	2011-2015		
Total Phosphorus (mg/L)	0.22 F	0.22 F	0.20 F	0.15 D	0.03 B	Phosphorus is found in products such as detergents, fertilizers, and pesticides. Phosphorus contributes to excess algae growth and low oxygen levels in streams and lakes.
Bacteria (CFU <i>E. coli</i> /100ml)	263 C	192 C	279 C	211 C	100 B (recreational use)	<i>Escherichia coli</i> ( <i>E. coli</i> ) bacteria is found in human and animal (e.g., livestock, wildlife) waste. Its presence in water indicates fecal contamination and is a strong indicator that other disease-causing pathogens are present in the watercourse.
Benthic Score (FBI)	5.79 D	5.71 C	5.57 C	5.73 C	<5.00 B (unofficial)	Benthic invertebrates are small animals without backbones that live in stream sediments. The pollution tolerances of taxa present in benthic samples are used to calculate the Family Biotic Index (FBI). The FBI ranges from 0 (excellent water quality) to 10 (very poor water quality).
<b>Overall Grade</b>	<b>D</b>	<b>D</b>	<b>D</b>	<b>D</b>		



# BEAR CREEK HEADWATERS FOREST CONDITIONS

# D GRADE

## Forest Conditions

For the Bear Creek Headwaters subwatershed, the three forest conditions indicators score two D grades and an F grade, producing an overall grade of D. The percent forest cover (11.5%) is close to the average for the St. Clair Region but is still less than half of the recommended cover needed to support natural species diversity and water quality. The percent forest interior (1.8%) is below the average for the St. Clair Region and is considered very poor as it is one-sixth of the recommended value. This indicates that most woodlots are too narrow to support area-sensitive species, such as Scarlet Tanager and Ovenbird. The Environment Canada guideline for southern Ontario is 10% forest interior. The percentage of the riparian zone that is forested (23.2%) is close to the average for the St. Clair Region though only half the 50% target.

Any changes in forest cover, either from forest loss or reforestation efforts, is visible using aerial photography. Although there have been a significant number of recent tree planting projects in this subwatershed, forests grow slowly, and young trees are not considered to be forests until they are at least 3 m tall and are developing a canopy.

## Local Actions to Improve Forest Conditions

- Establish and enlarge woodlots using a variety of native species to reduce the impact of aggressive insects and extreme weather events on tree health;
- Woodlot owners should prepare and follow Woodlot Management Plans;
- Connect woodlots by planting shelterbelts, windbreaks, and buffers along fields and watercourses to enhance wildlife habitat, protect against soil erosion, and improve water quality.

INDICATOR	BEAR CREEK HEADWATERS			ST. CLAIR REGION AVERAGE	PROVINCIAL GUIDELINE	INDICATOR DESCRIPTION
	2001-2005	2006-2010	2011-2015	2011-2015		
Percent Forest Cover (%)	11.8 D	11.7 D	11.5 D	12.0 D	30.0 B	Percent forest cover is the percentage of the watershed that is forested. Forests are necessary to produce oxygen, store carbon, and offer many ecological services that are essential to the well-being of both humans and wildlife.
Percent Forest Interior (%)	1.7 F	1.8 F	1.8 F	2.1 F	10.0 B	Percentage of the watershed that is forest interior. Forest interior is the core area inside a woodlot that is more than 100 m from the edge. The outer 100 m is 'edge' habitat and is prone to high predation, sun/wind damage, and alien species invasion.
Percent Forested Riparian Buffer (%)	No data	23.6 D	23.2 D	23.1 D	50.0 B	Percent forested riparian buffer is the percentage of forest cover within a 30 m zone along both sides of all open watercourses. Natural cover in this zone prevents sediment and nutrients from entering the water.
<b>Overall Grade</b>	<b>D</b>	<b>D</b>	<b>D</b>	<b>D</b>		



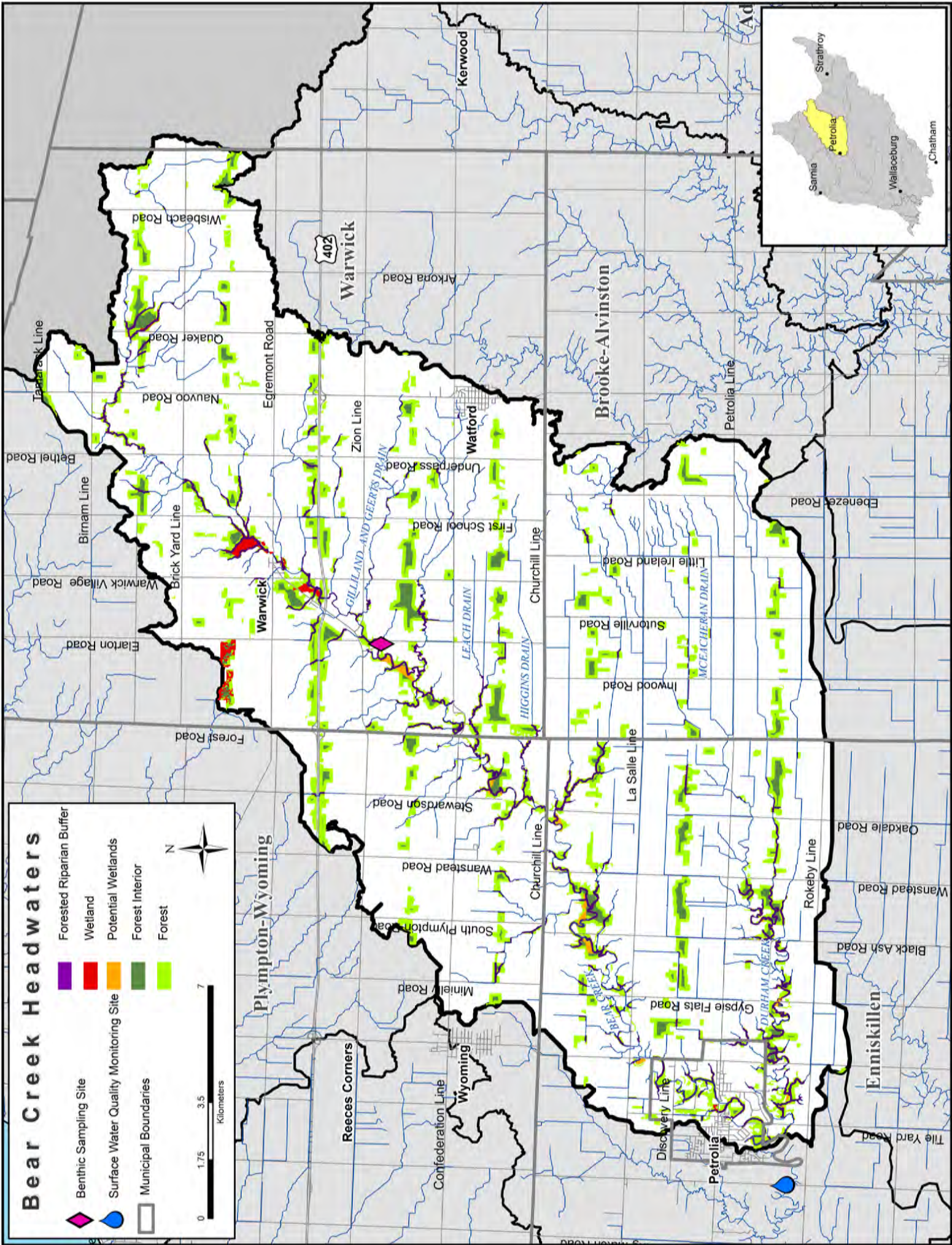
# BEAR CREEK HEADWATERS WATERSHED FEATURES

Area	379 km <sup>2</sup> , 9.2% of the St. Clair Region watershed
Municipalities	Warwick (166 km <sup>2</sup> , 44%), Enniskillen (89 km <sup>2</sup> , 24%), Brooke-Alvinston (67 km <sup>2</sup> , 18%), Plympton-Wyoming (47 km <sup>2</sup> , 12%), Petrolia (10 km <sup>2</sup> , 3%), Adelaide Metcalfe (1 km <sup>2</sup> , <1%)
Physiography	70% bevelled till plains; 16% till moraines; 10% till plains (undrumlinized); 4% sand plains; <1% beaches and shorecliffs
Soil Type	84% silt and clay; 5% silt and clay loams; 5% loam; 4% bottom land and beach; 2% sand loams
Streamflow	The mean annual streamflow was 3.41 m <sup>3</sup> /s from 2003 to 2015, as measured in Bear Creek just upstream of Petrolia. From 2011 to 2015, annual flows were above the mean, ranging from 4.07 to 4.34 m <sup>3</sup> /s. The previous period, 2006 to 2010, flows varied widely around the mean, from 1.89 to 5.30 m <sup>3</sup> /s.
Precipitation	The average annual precipitation at Petrolia from 2002 to 2015 was 897 mm. From 2011 to 2015, the annual precipitation varied widely around this value ranging from 625 to 1,118 mm. The previous period, 2006 to 2010, was wetter with levels close to or above the mean ranging from 760 to 1,131 mm.
Air Temperature	The average annual temperature at Petrolia from 2002 to 2015 was 8.9°C. From 2011 to 2015, average annual temperatures ranged more widely (7.4 to 10.4°C) than during the previous period, 2006 to 2010, which experienced more stable temperatures ranging of 8.0 to 9.8°C.
Tile Drainage	30% not tiled; 12% randomly tiled; 58% systematically tiled
Watercourse Length and Type	Total length: 540 km Watercourse type: 21% natural, 61% municipal drain, 18% unclassified
Dams and Barriers	Five dams, including two public dams at Bridgeview CA and at Warwick CA
Sewage Treatment	The Watford Sewage Lagoons discharge treated effluent through Moffat Drain to Bear Creek just upstream of Courtright Line, at the middle portion of this subwatershed. The Petrolia Water Pollution Control Plant discharges treated effluent to Bear Creek at the downstream end of Petrolia, near the bottom of this subwatershed.
Fisheries Resources	Fifty-eight fish species and 10 freshwater mussel species recorded. Game fish include Largemouth Bass.



# BEAR CREEK HEADWATERS WATERSHED FEATURES

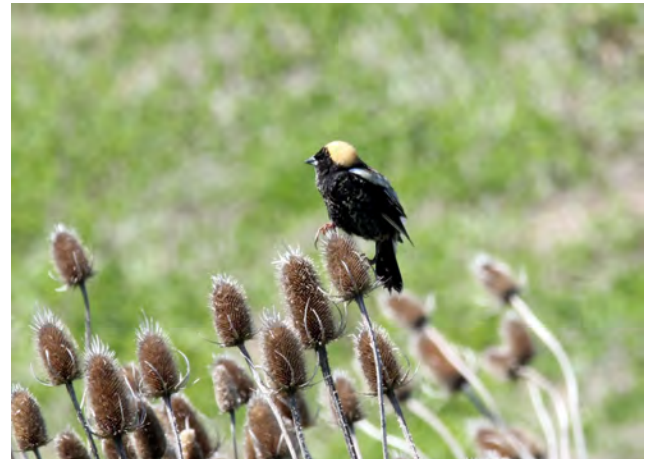
<p>Species at Risk</p>	<p>Birds: Acadian Flycatcher, Bank Swallow, Barn Swallow, Bobolink, Cerulean Warbler, Chimney Swift, Eastern Meadowlark, Least Bittern, Prothonotary Warbler, Yellow-breasted Chat</p> <p>Fishes: Blackstripe Topminnow, Brindled Madtom, Eastern Sand Darter, Lake Sturgeon, Pugnose Minnow, Pugnose Shiner, Spotted Sucker</p> <p>Mammals: American Badger, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis</p> <p>Mulloscs: Eastern Pondmussel, Kidneyshell, Northern Riffleshell, Rayed Bean, Round Hickorynut, Round Pigtoe, Salamander Mussel, Snuffbox, Wavy-rayed Lampmussel</p> <p>Plants: American Chestnut, American Ginseng, Blue Ash, Butternut, Eastern Flowering Dogwood, False Hop Sedge, Goldenseal, Kentucky Coffee-tree, Willow-leaved Aster</p> <p>Reptiles: Blanding’s Turtle, Butler’s Gartersnake, Common Five-lined Skink, Eastern Foxsnake, Queensnake, Spiny Softshell</p>					
<p>Groundwater</p>	<p>The shallow unconfined aquifers associated with the Wyoming Moraine to the northwest and the Seaforth Moraine to the southeast provide groundwater for agricultural purposes. For the majority of the region, the deeper aquifer at the interface between the overburden and the bedrock, known as the Fresh Water Aquifer, is limited in quantity and has elevated chloride. Therefore, most of the residents are supplied by municipally-piped water from intakes on Lake Huron.</p>					
<p>Wetland Cover</p>	<p>97 ha or 0.3% of the subwatershed is identified as wetlands by the Ministry of Natural Resources and Forestry. An additional 53 ha (0.1% of the subwatershed) are identified by the St. Clair Region Conservation Authority (SCRCA) as potential wetlands. Wetlands are vital to the landscape as they reduce flooding and filter water. Environment Canada recommends a minimum of 6% wetland cover at a subwatershed scale.</p>					
<p>Woodlot Size</p>	<p>Size Category</p>	<p>Number of Woodlots</p>	<p>% of Woodlots</p>	<p>Total Woodland Area (ha)</p>	<p>% of Total Woodland Area</p>	<p>Largest Woodlot (ha)</p>
	<p>&lt;5 ha</p>	<p>163</p>	<p>48</p>	<p>328</p>	<p>8</p>	<p>135</p>
	<p>5-10 ha</p>	<p>62</p>	<p>18</p>	<p>457</p>	<p>10</p>	
	<p>10-30 ha</p>	<p>69</p>	<p>20</p>	<p>1,119</p>	<p>26</p>	
	<p>&gt;30 ha</p>	<p>43</p>	<p>12</p>	<p>2,465</p>	<p>56</p>	
	<p>Total</p>	<p>337</p>		<p>4,369</p>		



# BEAR CREEK HEADWATERS HIGHLIGHTS

## Highlights and Progress Since 2011

- There were 19 landowner stewardship projects completed in the Bear Creek Headwaters subwatershed from 2011 to 2018. These projects included the restoration of wetlands, stabilization of streambanks, and the planting of trees and windbreaks. More than 43,700 trees were planted and the total value of all the projects was \$173,400 (65% grants).
- A 2-hectare assisted tree migration research plot was planted in 2016 at the Warwick Conservation Area to study the effects of climate change. Over the years, the 1,500 trees planted will be monitored to compare their relative survivability and growth success.



- New meteorological equipment was installed at the Warwick Conservation Area in 2015.
- To close research knowledge gaps, the SCRCA performed surveys of native mussel populations in 2017 and 2018, covering 28 km of the North Sydenham River.
- To aid in the future sustainability of local forestry, each year the SCRCA collects native tree seed, which is adapted to local growing conditions. In 2017, the SCRCA established a Tree Seed Collector Mentorship and Training Program through funding from Enbridge (left photo).
- Through the 2010-2012 Lambton Natural Heritage Study, regionally rare birds or plants were noted at every survey site, stressing the importance of maintaining and enhancing even small natural areas.
- Waste Management has been undertaking habitat creation and enhancement projects at the Twin Creeks Landfill for over a decade. A pair of calling Bobolinks, a Species at Risk, were sighted at Twin Creeks during an biological inventory performed by the SCRCA in 2017 (right photo, PC: Rick Battson).